NAVY CIVIL ENGINEER

SUMMER 1980

50 PUBLICATION YEARS

Welcome to 45 new Civil Engineer Corps officers

The quadrangle of the Naval School, Civil Engineer Corps Officers (CECOS), was the scene on September 12 for one of the largest graduation classes in recent years as 45 young officers of Basic CEC Class No. 156 received diplomas and new duty assignments.

Graduation speaker was Rear Admiral D. G. Iselin, CEC, USN, commander of the Naval Facilities Engineering Command, Alexandria, Va., and Chief of Civil Engineers. Diplomas were presented by Admiral Iselin assisted by the commanding officer of CECOS, Capt. Fred Kelley, CEC, USN.

Honor graduate of the class was Ensign Edwin B. Watts, CEC, USN. Class members are pictured alphabetically with college or university of origination and location of new duty assignment. (Those graduating "with distinction" are indicated by •).

Basic CEC Officers Class

Freedom Knowledge Action

CECOS

U.S. NAVAL SCHOOL, CIVIL ENGINEER CORPS OFFICERS

Graduated 12 September 1980

LTJG SCOTT J. AMOS
BSEE/U. of Utah
To Yokosuka, Japan

LTJG C. P. ASH
BS Arch./U. of Houston
To Long Beach, Calif.

ENS J. S. BANOMA
BSME/U. of Florida
To Memphis, Tenn.

•ENS S. R. BANHAM
BSCE/Oregon State
To Monterey, Calif.

ENS T. F. BERSSON
BSCE/Virginia Mil. Inst.
To Port Hueneme, Calif.

• LT JAMES L. BULLOCK
BS Oceanography/
Naval Academy
To Pensacola, Fla.

ENS F.A. CANTWELL
BSCE/Lafayette U.
To Willow Grove, Pa.

LTJG BRIAN H. CASE
BSCE Environ./Texas A&M
To San Diego

ENS J.W. CASSELL
BS Naval Arch./Naval
Academy to
Patuxent River, Md.

LTJG KARL T. CLEBAK
MSAE/Penn State
To inactive duty

ENS PAUL S. COOK
BS Arch./U. of Houston
To Cherry Point, N.C.

•ENS J. W. COWELL, JR.
BSCE/U. of Florida
To Stockton, Calif.

ENS ELIZABETH S. COX
BS Resources Mgmt./
Naval Academy
To San Francisco

ENS H. M. DAVIS, JR.
BSEE/Prairie View A&M
To Midway Island

ENS K. L. DORRELL
BSME/U. of Nebraska
To China Lake, Calif.

ENS SHARON L. HANLEY
BS Sys. Engrg./Naval
Academy to New Orleans

ENS CHARLES R. HERON
BSME/U. of Tulsa
To Port Hueneme, Calif.

LTJG DENNIS L. HESS
BSCE/U. of Missouri
To Portsmouth, N.H.

•ENS T. W. HOPKINS
BE Chem./Vanderbilt U.
To Yokosuka, Japan

ENS JON W. INGALLS
BS Arch./U. of Idaho
To San Diego, Calif.

ENS STEVEN R. ISELIN
BSCE/Notre Dame
To Port Hueneme, Calif.

ENS ROBERT L. JORDAN
BS Aerospace Engrg./
Naval Academy
To Port Hueneme, Calif.

Continued Inside Back Cover

Qualified engineering students may earn over $830 a month prior to graduation

☐ Students must be a U.S. citizen, between the ages of 19 and 27½ years, and within 12 months of graduation and enrolled at an institution accredited by the Engineers Council for Professional Development . . .

☐ and meeting current scholastic and physical standards upon acceptance into the program, they will be placed on active duty as Officer Candidate, Seaman (E-3), prior to receiving their baccalaureate degrees . . .

☐ upon graduation they will be required to complete Officer Indoctrination School, Newport, R.I., and the basic course of instruction at the Naval School, Civil Engineer Corps Officers, at Port Hueneme, Calif. . . .

☐ following completion of Officer Indoctrination school, and commissioning as Ensigns, Civil Engineer Corps, U.S. Navy, they will be obligated to remain on active duty for four years.

☐ Applicants are not limited to civil engineering but are eligible if completing degrees in *mechanical, electrical, ocean, petroleum, construction, or agricultural engineering*. Applicants enrolled in architecture must be pursuing study programs of at least five years duration in an institution by the National Architectural Accrediting Board.

For further details
Call toll free
Naval Recruiting Command
800-841-8100
or nearest
Civil Engineer Corps
Contact Officers
listed at right

Civil Engineer Corps Contact Officers

☐

LT David W. Gorden, CEC, USN
Code 09MB
Naval Facilities Engineering Command
200 Stovall Street
Alexandria, VA 22332
Commercial (202) 325-0312
Autovon 221-0312

☐

LT Kurt Ludwig, CEC, USN
Code 90 Northern Division
Naval Facilities Engineering Command
Philadelphia, PA 19112
Commercial (215) 755-3953
Autovon 443-3953

☐

LT Charles H. Schneider, CEC, USN
Code 09BN
Atlantic Division
Naval Facilities Engineering Command
Norfolk, VA 23511
Commercial (804) 444-4428
Autovon 690-4428

☐

LT Marcello A. Ranalli, CEC, USN
Code 00E
Southern Division
Naval Facilities Engineering Command
P.O. Box 10068
Charleston, SC 29411
Commercial (803) 743-4473
Autovon 794-4473

☐

LT Joseph D. Camp, CEC, USN
Code 09B1
Western Division
Naval Facilities Engineering Command
P.O. Box 727
San Bruno, CA 94066
Commercial (415) 877-7490
Autovon 859-7490

☐

LT Loren W. Smith, CEC, USN
Naval School, Civil Engineer Corps Officers
Port Hueneme, CA 93043
Commercial (805) 982-5655
Autovon 360-5655

☐

NAVY CIVIL
ENGINEER
(USPS 434-090)
VOL. XX, No. 4

Published Quarterly By
NAVAL FACILITIES ENGINEERING COMMAND
Alexandria, Va 22332

DONALD G. ISELIN
Rear Admiral, CEC, USN
Commander
and
Chief of Civil Engineers

WILLIAM M. ZOBEL
Rear Admiral, CEC, USN
Vice Commander
and
Deputy Chief of Civil Engineers

The Navy Civil Engineer is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20401. Price $1.25 per copy. Anual subscription rates: $5.00 for domestic subscribers; $6.25 for foreign subscribers. Send remittance only to the Superintendent of Documents. Application pending for entry as a controlled circulation publication at Long Beach, Calif.

POSTMASTER

Send address changes to *Publication office:*

The Navy Civil Engineer, Code C20M, Naval School, Civil Engineer Corps Officers, Port Hueneme, CA 93043. Tel: (805) 982-3104; Govt. Autovon 360-3104; Federal Telecommunications System (FTS) 799-3104.

Issuance of *The Navy Civil Engineer* (NAVFAC P-330) is approved in accordance with Department of the Navy Publications and Printing Regulations, NAVEXOS P-35. It does not alter, amend or supersede official regulations, orders or directives. Cost of printing is charged to appropriated funds for maintenance and operations of the Naval Facilities Engineering Command.

The Navy Civil Engineer is intended for the information of Regular and Reserve personnel of the Civil Engineer Corps, United States Navy, and key civilian employees of the Naval Facilities Engineering Command, subordinate commands and other mission-oriented activities.

All material accepted for publication by the Editor becomes the property of the U.S. Navy without recompense to the originator.

Manuscripts for editorial consideration and inquiries should be directed to the Editor at the publication offices, address listed above.

HAROLD WELSH
Editor
BILLYE GRYMWADE
Associate Editor
LOIS CHAVEZ
Design
RITA VASQUEZ
Circulation

EARTH SHELTER techniques and a review of recent studies concerning the feasibility of underground living and working areas are presented on page 12.

A CEC OFFICER recounts his experience as a prisoner of war in North Vietnam in what he terms his "POW career" on page 8.

OPERATIONS of the Navy Public Centers, together with a pictorial look at the PWC at Pensacola, Fla., begins on page 15.

IN THIS ISSUE

Safety Design of Small Arms Ranges 5
By G.W. Moy
Navy firing ranges and their design should be inspected periodically to insure that full safety criteria are accommodated.

My P.O.W. Career 8
By CDR Danny E. Glenn, CEC, USN
A low-key account of the author's experience as a prisoner of war for over six years of the North Vietnamese.

Earth-covered Is Beautiful 12
By Billye Grymwade
A review of contemporary attitudes of consumers, contractors, and investors concerning the construction of earth-sheltered homes as a new mode.

Removing The Holes From Pavement Potholes 14
By ENS Gary W. Femling, CEC, USN, and LT Robert L. Phillips, CEC, USN
The lowly pothole receives priority attention at the Naval Weapons Support Center, Crane, Ind., where a small investment yields substantial dividends.

Operational Profile Of The Navy's Public Works Centers 15
By John E. Roark
How the consolidated public works and maintenance is administered by the Navy's Public Works Centers for Navy commands.

Visitations To Field Operations — PWC Pensacola, Fla. 16
By ENS Stephen T. Eckel, CEC, USNR
A brief picture story how one public Works Center, that of Pensacola, Florida, serves its 'customers', the independent commands located there.

Most Effective Energy Management Is Management Action 20
By LT William W. Collins, CEC, USN
Sophisticated and futuristic techniques may solve some of our energy problems but not as realistically or rapidly as determined management.

Navy Energy Environmental Support Activity 21
By CDR Lee R. Bohning, CEC, USN and LCDR John P. Collins, CEC, USN
The recently commissioned NEESA (see page 32) encompasses many related fields which are briefly discussed in this special selection.

Radiological Affairs. 22
By LCDR Ken Groves, MSC, USN
Overseeing safety precautions in the use of radiological material and devices within the Navy industrial community.

Safety And Health 23
By Joy Erdman
NEESA becomes a key agency in defining occupational safety and health standards to navy commands for personnel protection.

Mobile Power Generation (MUSE) 24
By LCDR Michael E. Foster, CEC, USN
The well-proven Mobile Utility Support Equipment (MUSE) unit now logically joins the newly formed Navy Energy and Environmental Support Activity.

Environmental Protection 25
By Earl H. Moser, Jr.
The Navy, as a federal agency, must comply with environmental protection statutes including state and local regulations. NEESA aids in compliance.

Energy Conservation 27
By Philip R. Winters
The national challenge - energy conservation - is accepted for the Navy by the NEESA energy office through research and monitoring techniques.

Index, The Navy Civil Engineer, 1979-80. 29

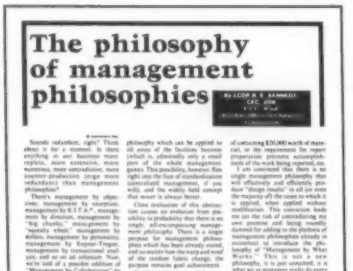
Maintenance Service Contracting — friend or foe?

LCDR John H.T. Miles
CEC, USN

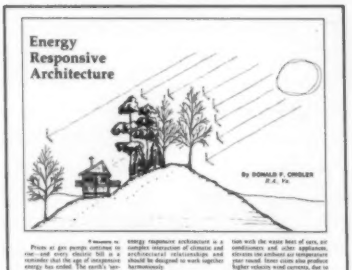
Commander's Award for Editorial Excellence

LCDR MILES receives bronze Commander's Award from Rear Admiral Donald G. Iselin, CEC, USN (right) at Naval Facilities Engineering Command Headquarters, 20 September 1980. LCDR Miles was cited for the outstanding contribution to **The Navy Civil Engineer** during the 1978 publication year.

Honorable Mention


The philosophy of management philosophies

CDR Ronald E. Kennedy
CEC, USN


Energy Responsive Architecture

Mr. Donald F. Crigler

Those Magnificent Seabee Reserves

CDR Ray A. Smith
CEC, USN

'ZEROING IN' ON

Firing Range Safety Designs

by G.W. MOY
P.E., Va.

• Alexandria, Va.

The effectiveness and efficiency of the Navy's military personnel depend to a considerable degree upon their shore training. Outdoor small arms ranges are one of the basic training elements. The safety philosophy of the Naval Facilities Engineering Command's (NAVFAC) criteria for small arms ranges should be reviewed, particularly how small arms ranges can be inspected for safety, and the approved methods for correcting deficiencies.

In this day of product liability and litigation, the safety of Navy small arms ranges is under scrutiny. This should be welcomed by an activity's commanding officer as safety precautions always make good sense. The overall evaluation of ranges should be encouraged and be comprehensive.

Incalculable damage to the Navy's image can be caused by injury to innocent personnel who, unknowingly, are within a range impact area. In fact, such injuries could force the closing of an otherwise effective training facility. Constant safety appraisals must be made to keep the Navy's small arms range training facilities open and operating.

NAVFAC safety criteria for outdoor small arms ranges are based on one objective: to prevent injury to personnel or property damage outside of the range proper from misdirected or accidental fire and ricochets. The criteria provide two methods to accomplish this objective.

The first method involves the concept of "surface danger area." Essentially this approach is to assure that there is no property (buildings, antennas, etc., not to mean simply land) nor personnel in the area where bullets may land once they have left the range proper. This area, known as the surface danger area, or impact area, is determined from the maximum range (including a ricochet factor) of the small arms ammunition used.

The maximum distance, the full surface danger area, is determined when the weapon is fired between the angles of 25° to 33° elevation. Accidental fire can cause bullets to land anywhere in the danger area up to and including the maximum distance. The surface danger area should be restricted and controlled at all times during range operation. Otherwise, it serves no safety function for the range. Precise surface danger area configurations and distances are published in NAVFAC Design Manual DM-27, *Training Facilities.*

The second method involves the concept of the fully baffled and bermed safety ranges. Essentially, this type of range is constructed so that almost all bullets can be contained within the range proper. NAVFAC definitive designs were made with intent of containing misdirected fire and primary ricochets. The existence of secondary and erratic ricochets requires a 300 yard surface danger area which serves the purpose similarly to the full surface danger area discussed, but for ricochets. Changes can be made to the NAVFAC definitive designs and eliminate the entire surface danger area required by containing *all* bullets within the range proper.

How can NAVFAC criteria be applied to proposed and existing small arms ranges? Given a range, whether proposed or existing, the first step in the examination is determining the required surface danger area. The weapons and ammunition to be used on the range can determine the range surface danger area (see aforementioned DM-27) and be drawn on the activity's general development map or the applicable USGS quadrangle map. Once the surface danger area is drawn, a determination of what is within that area must be made. This is the most important step of evaluating the range. It will determine whether or not the range can contain all bullets within the confines.

If there are no structures or people within the range surface danger area, the area is under Navy control, and it is restsricted during range operation, and then the range meets NAVFAC criteria for safety. However, if there is any evidence of possible external encroachment or trespass on that danger area in the future, the safety of the range must be thoroughly reinvestigated. This includes encroachment by land, sea, or air.

Note that a distinction must be made between surface danger areas which are Navy-controlled and surface danger areas which are not.

(Continued next page)

Firing Range Safety

(Continued from preceding page)

In an administrative sense, each activity can control the area over which it has cognizance. However, this control does not extend into private property, navigable and recreation waterways or public property controlled by other agencies. Hence, if any non-Navy controlled facilities, personnel, property or just plain non-Navy area exists within a Navy's range surface danger area, full surface danger area is certainly not available to that range. For such conditions, steps must be taken to contain bullets only within the Navy-controlled property, unless the Navy can gain control of the area necessary to complete the surface danger area. One such way would be to purchase the additional required land. If the additional area needed is over a body of water, obtaining permits from the Army Corps of Engineers could complete the necessary danger area.

If the range surface danger area is within Navy control and has facilities within it but no people, a determination must be made to their importance and significance. If it can be logically determined that the facilities are of no importance, and damage due to accidental fire is of no significance, then the range also meets NAVFAC safety criteria.

If one of the following conditions exists, steps must be taken to eliminate hazards to people and property:

- Non-Navy-controlled land or bodies of water are within range surface danger area.
- People or important facilities are within range surface danger area or air operations are within bullet trajectory paths, whether the area is Navy-controlled or not.

The hazards that exist in these situations are that innocent personnel may be hit by accidental fire who are not aware of the danger. The alternatives available to eliminate these possible hazardous situations are:

- If the surface danger area is entirely under Navy control, determine if personnel located within the range danger area can be moved to other sites or personnel activities closed during range operation.
- If the surface danger area is partially or entirely under non-Navy control, determine if easemesnts for the necessary land or water area to complete required danger area can be obtained.
- Determine if there are any areas within the activity that are available for re-siting the range(s) and still maintain the appropriate surface danger area.
- Determine availability and possible use of existing small arms ranges at surrounding military and civilian installations.
- Request a waiver to operate the small arms range under present conditions, if the range is currently in existence. (See OPNAVINST 8023.20A)
- Construct a fully baffled and bermed safety range. The above is not intended to be all inclusive or ranked in priority. It is intended to provide a guide of available options for range safety.

The first four alternatives can be investigated and determined whether feasible by the activity. The fifth alternative requries a waiver request by the activity to Naval Sea Systems Command, in accordance with current instructions.

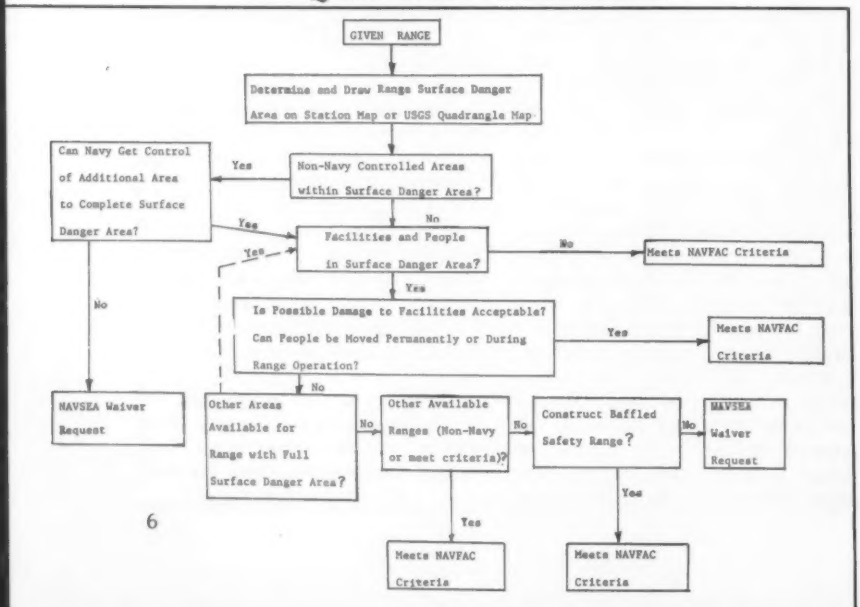
The last alternative has been mentioned before. As stated previously, a safety range is a range constructed such that no bullet can escape the range confines. Criteria for safety samll arms ranges are included in NAVFAC-P-272-Definitive Drawings and NAVFAC DM-27, Training Facilities.

The principle used in the NAVFAC definitive design is that a bullet can travel from the firing line to anywhere the eye can see, 180 degrees towards the target line. If the eye's vision in any firing position is blocked from viewing the sky, then a bullet should also be blocked or contained if ground baffles are used to control ricochets.

Consequently, the heart of the NAVFAC definitive design is the combination baffling-berm system. The baffles and berms were placed so that all one can see from the firing line is either the canopy, overhead baffles, ground baffles, side berms, back berm, or the targets. In addition, all firing positions between 0'-6" to 6'-0" height were taken into acocunt. There is no path for direct fire or primary ricochets to leave the range proper.

Each element of the baffled safety range plays an important role. The canopy and overhead baffles are designed to contain bullets accidentally fired directly downrange at elevation angles of greater than 0° and less than 90°. Ground baffles are designed to contain bullets accidentally fired directly towards the ground and ground ricochets. Side berms are designed to

Quick Glance Criteria Check.



contain bullets accidentally fired to either of the sides of the range. Finally, the backberm is designed to contain bullets fired at and around the targets. Each element of the NAVFAC definitive design for baffled safety rifle and pistol ranges is designed to contain bullets within the range proper.

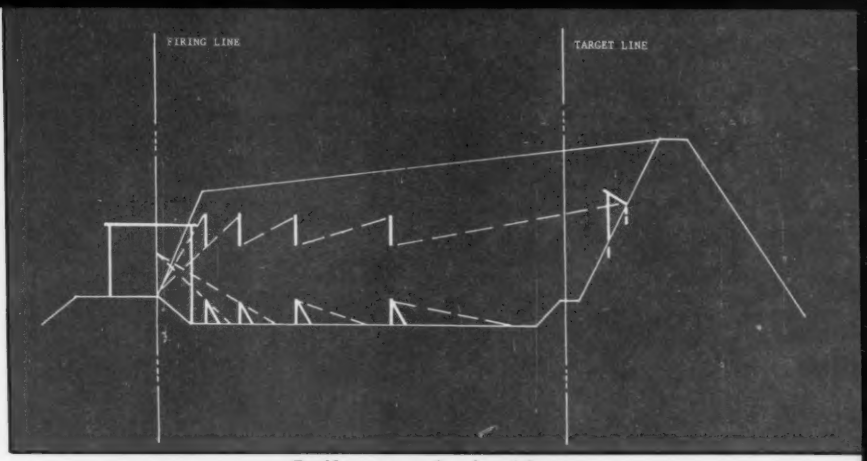
Because erratic and secondary ricochets may exist, a 300-yard surface danger area is needed and is included in the definitive design. If these types of ricochets could be eliminated, then this surface danger area could also be eliminated. One way of doing this is to provide a concrete surface spanning the area between the firing line and target line. Ricochets off of the concrete surface are more predictable (closely follow the concrete surface) and can be contained by the baffling/berm system.

The fully baffled and bermed safety range alternative usually requires NAVFAC design assistance and can be built at a minimal cost.

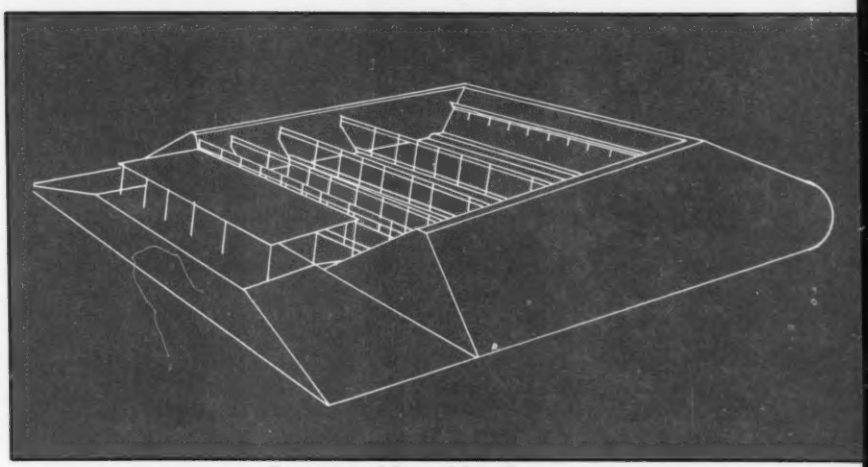
There have been comments that the design criteria promulgated by NAVFAC for baffled safety ranges as being too expensive and too restrictive. As can be noted from the alternatives listed above, the baffled safety range is only one of a number of alternatives available to the activity. The most cost-effective alternative should be chosen. Sometimes, however, the baffled safety range may well be the only alternative available to an activity in need of small arms training.

Many small arms ranges have operated safely for years without incident. However, one accident can destroy a previous good record, no matter how unlikely that accident may be. Personnel change, newer operating conditions exist, and other factors which add to range safety are not constant.

For example, in recent years, due to the omission of designated range surface danger areas on development maps, more and more facilities and activities have encroached many range surface danger areas. So, while the range may have had the required safety area in the past years and accidental fire endangered no one, the premise may no longer be true. Indicating the surface danger area of a range on a general development map, as is done for quantity distance arcs, would help in preventing unknowing encroachment.



Profile, not to scale, of model range



Perspective of the model small arms range

The safety of a range should not be viewed as a result of its past history, but as a study of its current and future operation and the environment around it.

One factor that range safety heavily depends upon is the operational requirements and discipline that exist at a range. Controlling the direction in which a barrel is pointed can aid in keeping bullets within the range proper as well as the physical characteristics of the range can, if not more so. Accidental discharge of a weapon can occur at any time, in any direction, simply because of human carelessness. Firing range discipline can reduce the chance of that accidental discharge.

NAVFAC criteria was developed for small arms ranges regardless of the type of range operation and control. NAVFAC can review a range only from its physical aspects and its ability to insure that there are no people or facilities of importance or non-Navy controlled area within the range surface danger area or, if that is not possible, contain bullets within Navy-controlled property or the range proper.

NAVFAC firing range criteria is designed for and intended to give the activity the maximum amount of flexibility for range operation and siting, without having to worry about injury to people or property within the range surface danger area. □

My P.O.W. Career

By CDR DANNY E. GLENN,
CEC, USN
R.A., Hawaii

CDR Glenn was a naval aviator during the Vietnam years and became a Civil Engineer Corps officer following his release from captivity. He is assigned the Trident Submarine Base, Kings Bay, Ga. Another ex-P.O.W. who is now a CEC officer is CDR Wayne K. Goodermote, CEC, USN, stationed at Public Works Center, Guam. He is formerly a naval flight officer.

I've had three careers: I was an aviator, I was a POW, and now I'm in the Civil Engineer Corps. I think of that as three careers because it's three distinctly different things that I've done. I can think of my POW experience as a career because it's what I've done the most of.

When you spend 2,266 days, 24 hours a day, doing something, you get fairly good at it after awhile. We all became very good at being a POW.

People say, "Wow, you were a POW for six years!" That's not the most significant thing. I didn't have any choice. The thing that was more significant is what we were trying to do while carrying out our job in the Navy. That's outlined in the Code of Conduct. It describes the responsibilities that you have, and your responsibilities do continue after you get shot down and you're cut off from your country. You have to go it on your own. You're left with your own resources. You meet it with dedication and determination that you're going to do it to the best of your ability. You meet it with common sense.

I'm sure every POW situation is different. Ours was completely different from the Korean situation. Once we got there and found out what the problems were, we met them with whatever knowledge, background and resources we had. We picked out a good course and headed in that direction.

Another thing that's good to have is a sense of humor. I can't say that I really enjoyed it, but occasionally we had to laugh at it. And, of course, we needed a faith in our God, in our country, and our family to see us through until we came back.

The last time I gave a talk on being a prisoner of war I had my notes with me, and my notes consisted of a cup that I had the entire time I was there. Well, that cup is some other place but I did bring something else with me. It's a two dollar bill.

You don't need too much money to go flying over North Vietnam. The day I was shot down I had $2.15 in my pocket.

We were probably within a couple of weeks of getting out and The Vietnamese were being a lot nicer than they had been before. They called me over to a quiz room.

The interpreter said, "How much money did you have when you were shot down?"

I said, "I had $2.15."

They didn't understand that. They knew what the dollar was. That was fairly common, but they didn't know what cents meant. He said, "What do you mean, 'cents'?" And I said, "Two dollars and fifteen pennies." He looked in his little box, searched around and brought out the two dollar bill and fifteen pennies. He gave me $2.15.

When I got on the airplane, about a week later, to fly out to Clark Air Force Base, I had that two dollar bill with me, and I had everybody on the plane sign it. I think the two dollar bill is symbolic. I haven't really figured out all the symbolism there, but after six years, I came out with the same value that I went in with. It wasn't really changed. It was changed in form, maybe, but it wasn't changed in value.

People ask me if I mind talking about being in Vietnam. No, I like talking about it, just like all the rest of us like talking about our past experiences, and we like telling sea stories. Nobody likes telling sea stories better than aviators. The things that I say will be pretty much limited to the group of captured aviators.

For the most part, we were kept in and around Hanoi. At one time I was kept in a camp within five miles of the Chinese border. I'm not sure how far that was out of Hanoi, but it was about a 36-hour truck ride. Normally, when we were moving from camp to camp, we'd be blind-

folded, handcuffed, sitting in a truck, and not allowed to talk.

They didn't want us to communicate with anybody else, and if they could have kept us from communicating with our roommates, they would have. They didn't have enough rooms to put everybody solo. In the early days, the solo prisoner was more the rule than not.

The Hanoi 'Hilton' was a large prison complex built by the French in 1929. It had several areas in it where they kept us at different times. We had different names for them as if they were different camps. I was in and out of there.

Also, I was in the Zoo. The Zoo was in the outskirts of Hanoi. At one time it had been a French film studio, and they had converted that to a prison.

I was at Son Tay nearly the entire time that it was open. Of course, the big problem was that I wasn't there when the raid was made. If I had been there, I would have been out a lot sooner.

I also lived at the place near China which we called Dog Patch. It was in the mountains and the jungles — a very remote place.

The average room was small. It was a four-man room. In the Hanoi Hilton it was 8 x 8 feet, and it had two bunks — two beds on one side and two beds on the other with about 2.5 feet down the middle where you could walk back and forth. If you lived in a four-man room under those conditions, your exercise program consisted of three men sitting on a bunk and one getting his exercise walking or doing pushups on the floor. We did a lot of exercises on the bunks.

The Hanoi Hilton, when it was built, was not divided up into small cells. It was divided up into large rooms. They installed walls to make small cells, none with a common wall. They did this to keep communications down between cells.

The Dog Patch prison was built from scratch, and we guessed that it was built in 1969. But in 1969 the trend was to give better treatment because of the pressure being brought upon the North Vietnamese for the poor treatment that we were getting. In 1970 when the Son Tay raid came, they moved everybody back into Hanoi.

In 1972, when the bombing raids started up again, and Hanoi got to be a hot spot, they moved some of us up to Dog Patch. The walls were rock and at least a foot and a half, sometimes two feet thick. It was colder. If people had been kept in that prison in the earlier days, there would have been more deaths in North Vietnam. We were let out of individual cells during the day and could roam around inside the cell building. We had additional blankets. It helped make that winter survivable.

They generally were not concerned with conditions. They merely built a place to keep us and store us away until such time as when they needed us. Probably the best thing we had going for us was that we were a valuable possession of the North Vietnamese. We were something they had that they could bargain with. Without the prisoners, they didn't have a whole lot of bargaining power.

The quizzes varied quite a bit. When you first got shot down, they were looking for military information, but it wasn't too long before your military information was outdated. So the primary importance of the North Vietnamese quiz was not military but more political.

They wanted political statements from us. They wanted to feed us propaganda — try to change our way of thinking, which they found out they couldn't do, but they continued to try it anyway.

A typical early quiz right after we were shot down would be for the interrogator to come in and make a few demands that we weren't going to answer. Then they would start with some method of coercion which could be just leaving us sitting there on a stool. (And they might keep us sitting there for a matter of days, a week or two weeks to let us think about our 'crimes'.)

Or, if they were in a hurry, they would resort to the torture methods which I don't want to dwell on. They were good enough to get what they

(Continued next page)

"In each of America's wars our prisoners of war have been called upon to make uncommon sacrifices. Upon them has fallen the arduous responsibility of defending American ideals under the absolute control of the enemy. Extremely difficult at best. This responsibility becomes magnified almost beyond comprehension when men and women are treated inhumanely — in violation of ordinary human compassion, fundamental moral standards, and basic international obligations. The Congress has by joint resolution designated July 18, 1980, as 'National POW-MIA Recognition Day.'

"All Americans should recognize the special debt we owe our fellow citizens who, as prisoners during wartime, sacrified their freedom that we might enjoy the blessings of peace and liberty. Likewise we must remember the unresolved casualties of war — our soldiers who are still missing. The pain and bitterness of war endures for their families, relatives, and friends. Our nation will continue to seek answers to the many questions that remain about their fate.

"Therefore, I, Jimmy Carter, President of the United States of America, do hereby designate Friday, July 18, 1980, as National POW-MIA Recognition Day, a day dedicated to all former American prisoners of war, to those still missing, and to their families. I call on all Americans to join in honoring those who made the uncommon sacrifice of being held captive in war, and their loved ones. And I call on staff and local officials and private organizations to observe this day with appropriate ceremonies and activities. In witness whereof, I have hereunto set my hand this second day of July in the year of our Lord Nineteen Hundred and Eighty, and of the independence of the United States of America the two hundred and fourth. / signed / Jimmy Carter

wanted. They knew how to apply pain without disfiguring.

Our idea was that with a little determination you could hold out until passing out, and then it's all over. If they kill me — that's the way it goes.

A good philosophy is that once you're shot down, you're lucky you're not dead, but you might as well consider yourself dead because they can kill you any time they want to. They've got that option. Once you accept that fact, you're ready to resist until death. But it doesn't happen that way. You resist until you lose control. Then they have things going their way.

The people in the villages were very naive. I was captured in a village and they were as curious about me as I was about them. I was turned over to the Army to what I thought were four hardened combat veterans. They were very serious, very business-like, and I could tell they considered me as being the enemy and maybe of the worst kind.

In the prisons, we had guards, turnkeys, and quizzers. A typical officer in the camp would probably be a second lieutenant. The turnkeys were enlisted. They liked to make you think they were combat veterans, too. Everybody wanted to shoot down an airplane.

We had one guard that we called "The Wedge" because he was a simple tool. He told us that his wife manned an anti-aircraft site in Hanoi, and that she had shot down three or four airplanes. We would just nod. The most interesting thing about The Wedge was that he was always coming around with a bandage on him — on his toe or on his hand. One night he showed us his hand. It was badly burned. He was trying to explain how it happened. It took quite awhile because he was doing it with sign language, and we were trying to interpret. We finally figured it out. The Wedge had done the classic trick. He had checked the gas in the gas tank, and the only way he could do it was to light a match.

Conditions were completely unbearable in some cases, and prisoners did die just simply because of lack of the basics. But around in late 1969 and early 1970, the pressure on the Vietnamese for their poor treatment got to be such that they did change — things didn't get good, but they got better. Prior to 1970 you lived in constant fear that they were going to come in at any time and do something you didn't like.

CDR Glenn is shown with Billye Grymwade, associate editor, on National POW-MIA Recognition Day, July 18, 1980. Grymwade wears an MIA bracelet in honor of S/SGT Larry Newman, USAF, missing since June 18, 1972.

The things we were given to live with in prison were a pitcher for water, a cup, a bucket, two sets of lightweight pajamas, a small jersey type sweater, a blanket, a mosquito net, and a straw mat. We slept on either a board or a wooden or concrete platform. Sometimes we would sleep on the floor. After two or three years they gave us a fan. That kept us busy during the summertime.

The dishes were kept on a rack outside the room. The food was served twice a day. Generally, it was soup and rice or soup and French style bread.

Propaganda was a constant program. In every room there was a radio speaker which was always on. It was the same thing, over and over again. This was what they thought was the real story, and they would try this on us, and we would use logic back on them. We were as effective with logic as they were with propaganda because they didn't understand logic.

There's one story about the Zoo—when they first started putting speakers in, wires ran all around the rooms. Two men were tapping back and forth to each other, "What do you think all these wires are for?" It was the middle of the winter, and one was particularly optimistic. He said, "We're going to get electric blankets."

There were two kinds of medical problems. You either had a headache or a stomach problem. If you had a headache, they gave you an aspirin. If you had a stomach problem, they gave you a diarrhea pill. Outside of that, you really didn't get much treatment. They would have somebody who was designated as a medic. One medic that I had a particularly strong feeling for was a former water boy at another camp. That was about all the qualifications he had. They did have some other people they called doctors. You didn't see the doctors very often, but maybe once a year they'd come around and say, "This is the doctor." He'd look you over and say, "Yeah, you're all right."

We had camp regulations, which were posted on the door. And if you didn't memorize them, you were punished. Some of them were: *No loud noise. No escape. No communications. Take care of everything that you're given. Be respectful. Repent of your crimes.* And then, there was a catch-all phrase. *You must do anything told to you by any officer or guard of the camp.* Anything that wasn't covered in the regulations, if they said to do it, you had to do it.

I'd like to say something about the construction. One time they were building two new buildings. I was in a two-man room on the opposite side from where the construction was going on. On the other side of my wall there was a solo who was a Marine. He gave us a description of how the building was going, day by day. This was a cheap job. The roof of this building turned out to be one layer of felt, and that was it. I guess that was their 'temporary wartime construction.' The structure was about 23 feet wide and about 48 feet long and one day the Marine tapped, "Okay, they're going to build a wall in the middle. Maybe they're going to divide it up into cells." So the next day I was anxious to get the report on how the wall went. He said, "You won't believe it. They started on this wall from one end and another guy started on the other end, and when they met in the middle — it was about a foot apart!"

We didn't get much mail. There wasn't much communication from the outside. Everything we heard was what they gave us. Naturally we didn't get the World Series or the Bowl games or anything like that. Sometimes we got Hanoi Hannah, and we thought we were doing good when we got that.

In the early days we couldn't determine why one person got to write and some other person didn't, but generally it was about 5% of the people who were getting to write. It meant that around Christmas they'd say, "Okay, you write a letter now."

In late 1969 they started a letter-writing program and they came out with a six-line form.

I got to write my first letter in 1969 which was three years after I was shot down, and it did make it home for Christmas and that's when my parents got the first letter. I received my first letter after four years. I probably got about 14 letters, total. As a matter of fact, I think I got my first package before I got my first letter. They didn't let us have anything that they didn't think we should have — no reading material or pastimes. A tube of toothpaste or some candy or food was allowed. I received a total of six packages while I was there. After Son Tay, they didn't know whether we were getting communications from the outside or not, but they wanted to make sure that we didn't. They would cut up the packages! This went as far as slicing raisins!

The days went by very slowly, but the months passed quickly. Somebody asked me how I kept track of time, and it was really no problem. You didn't have anything else to think about. When you woke up every morning, you thought about what day it was.

One of the best things to pass the time was the exercising. It was very important, we felt, to stay in as good condition as we could. If we happened to be in leg irons, we would do situps in leg irons. If we happened to be in a small room, we could run in place or do pushups.

We talked a lot, and if you were fortunate enough to have a roommate, you talked about everything.

When we got into a large room, we were able to talk to new people. If I got a new roommate, he was able to tell me everything he knew plus everything every one of his roommates ever knew. From this we developed an education program. I was the architectural 'expert.' I believe that I was the only architect in North Vietnam. I haven't had anyone disprove that theory. A reputation would get around. I had people move into the room and they'd say, "Oh, I've been waiting for years to show you this plan I've got." Many had house plans. We would get a piece of tile and draw it out on the floor and I would critique his plans. I had several 'architectural commissions' while I was there that I never collected for, but we haven't built the houses, either.

We liked to tell movies. A movie that took 15 or 20 minutes to tell could be stretched into a four-hour special. Our recall got better as time went by.

Communications is probably the most important part of my experience as a POW. The one thing that probably kept us together, more able to continue our resistance, and more able to do our job was the communications that we had. The communications was any way that you could talk to another American prisoner. It was under the door when the guard wasn't around; tapping on the wall; it was visual communications; we used any kind of code that two people had in common; and Morse code was used.

But the tap code was probably the thing that was most commonly used. The code is very simple. You take the alphabet and put it in a 5 by 5 matrix with a, b, c, d and e across the top and the next five letters and the next five letters, so that down the left hand side you have a, f, l, q and v. You have to throw out k because there are 26 letters. Every time we needed a k, we used a c. I learned the tap code when I first went to Hanoi. It was scratched on a table in the interrogation room.

You had to 'clear' the guards. Sometimes tapping sessions would last for two or three hours. The guard could come by and we had better look like we haven't been on the floor. We had better look like we've just been sitting around contemplating our crimes.

We also found we could talk through the walls if we used our cup. We put it against the wall and put a blanket around it to muffle the sound. We would shout into the cup. Enough of the sound would transmit through the wall. When tapping through heavy walls, we used the cup to listen with. We had to have better clearing for talking through walls, so we didn't usually do that unless we had more people in the room.

And then we got to where we had a little better line-of-sight communications. We developed a hand code which is similar to the deaf person's code. We used hand signals for each letter of the alphabet and that could go very fast.

We could pass instructions from the senior people in the camp. This was when we had about 350 people living in the Hanoi Hilton. Some of them were in large rooms. Some of the more senior people were still solo, but they were able to get out some of their instructions.

The most important thing about the experience of being a POW in North Vietnam was the people that I worked with. I'm glad that I survived the six years, and I'm proud to be a part of that experience. □

Earth-Covered Is Beautiful

By BILLYE GRYMWADE
Associate Editor

• Port Hueneme, Calif.

"Underground," "earth-sheltered" and "earth-covered" are terms that are trying to make it to the top.

What is the status of underground structures in this nation and elsewhere in the world? We are already well entrenched in rapid transit subways, sewer and water conduits and road tunnels. We also go underground for oil, water and solid material storage. Underground nuclear power siting is a reality. There are some underground offices, manufacturing areas and university buildings. In Minnesota there is a partially underground zoo and a library and in Egypt there is a proposed underground museum (what better way to display and preserve artifacts from a tomb thousands of years old?). Finally, in a return to the caveman's mode, we are building earth-sheltered and earth-covered homes.

Money Is First

There are three main advantages to underground structures that its proponents are eager to make known:

- Environmental protection — Using underground space is an economic solution to the need for improving the environment in which we live.
- Low-cost storage — Bulk storage of food, water, oil and manufactured products is necessary in the distribution process. Underground space provides an economical large-scale storage of these products.
- Energy Savings — Operational costs for heating and cooling for subsurface single buildings and for major industrial plants are reduced, compared to surface facilities. Underground space also provides economic benefits for the development of renewable energy sources: solar and wind energy, which need large-scale, long-term storage.

Before earth-sheltered building can happen, there must be money to finance the innovative structure.

Money lenders should look with favor at earth-sheltered homes because of their potential to reduce energy costs as much as 30%, 50% or even 80% thereby reducing the risk to both the lender and owner of monthly payment overload. Payment overload happens when mortgages are written to include early low payments, with escalating payments during the life of the mortgage, and with increasing utilities rates.

Education about earth-sheltered structures needs to be directed toward architects, public officials, contractors, appraisers, lenders, insurers, public policy makers and consumers. Without support from all these segments of society, especially money lenders, growth in underground structures will not be readily realized.

Consumer Attitude

In March 1978, at Greenville, S.C., a survey was conducted of consumer attitudes toward an earth-sheltered and solar-heated house.

More than one-half of the sample

indicated they would like to live in an earth-insulated home if it were the right size for the family.

Over 40% of the respondents reported they were "somewhat" to "very likely" to build an underground home within five years.

It was found that the expectation of purchasing or building an underground home in the near future was greater for males than for females and for people aged 25-34 yars and 45-54 years than for other age groups.

There appears to be little past research concerning consumer acceptance of earth-sheltered or earth-covered homes. At this time, it seems the best gauge for consumer acceptance of this house form would be the number of underground dwellings built in a region, in a nation, in the world. However, no such count exists.

Contractor Attitudes

Attitudes by residential contractors toward earth-sheltered construction is another important test to its potential.

In a survey of residential contractors in Wisconsin and Minnesota, it was found that contractors there are building energy-saving houses, using higher R-value insulation, double- and triple-glazed windows, and other energy saving measures. It was also found in those two states that contractors are presently undecided about residential earth-sheltered construction. They are not sure of its value and do not think the public is ready to accept it.

The survey showed that contractors feel they need professional manuals and other documentary reference to become more competent in performing earth-sheltered construction. They also feel the need for formal training to determine correct sizing and reinforcement for underground structures. The need for formal training (to become competent at the identified tasks for underground construction) was expressed by 16% of the contractors.

Finally, the survey indicated that contractors would participate in training programs in earth-sheltered construction principles.

Navy Study

The Navy's effort toward underground structures is taking the form of a study made by NAVFAC with an architect/engineer firm in Minneapolis.

The study concerns five geographic locations and two types of buildings: people oriented and non-people oriented. Four conditions were also studied: the regular building, the half-bermed building, the building fully bermed to the roof, and the building fully bermed and covered with earth. The feasibility of constructing such buildings is based primarily upon energy savings. Noise abatement is another consideration.

Construction of bermed Navy dental buildings and Navy hospitals is already under way. Completed construction exists on North Island, San Diego, Calif., where there is a half-bermed structure for the dental clinic.

The purpose of the study is to make a design manual for the Navy's earth-sheltered construction.

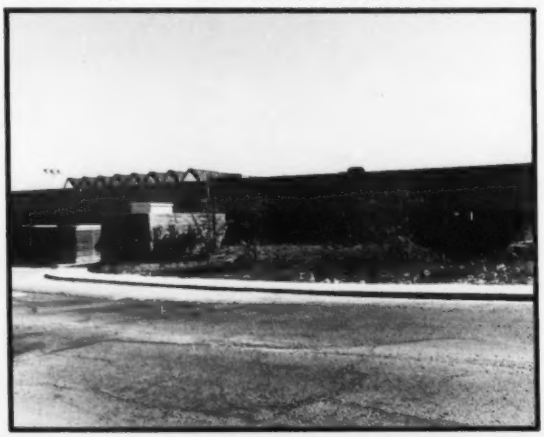
International Recognition

To broadcast the good news about underground space use to all nations, there will soon be published the results of an international meeting held in Stockholm, Sweden. Themes selected for discussion are: underground storage of food, water and other solid products; environmental protection by underground use; energy savings and energy conservation by underground use; and waste disposal underground.

Such meetings should help the technical associations to gain recognition by the groups that have a major influence on the development of society — the people that make the plans and major decisions in the different nations.

Another meeting is scheduled for Kansas City, Mo., in the summer of 1981. Its purpose is to bring government and industry together with technical authorities on underground space use in North America.

Although the surveys and the national and international meetings seem to have underground construction on the upswing, it appears it still has a long way to go to become accepted by the general public at home and around the world. □



Interior and exterior views of the dental clinic on North Island, San Diego, Calif., indicate the half-bermed structure, which allows light to enter through high windows. The sunlight provides heat in the winter.

Removing the holes from pavement POT HOLES

By ENS GARY W. FEMLING, CEC, USN
EIT Washington
Shops Engineer,
Public Works Department
Naval Weapons Support Center

And LT ROBERT L. PHILLIPS, CEC, USN
EIT California
Assistant Resident Officer in Charge of Construction/Northern Division
Naval Weapons Support Center

• Crane, Ind.

No one has been able to explain the uncanny ability of vehicles to seek out and hit potholes in the road. Unfortunately, this magnetic-like relationship exists and eventually leads to unsafe driving conditions, additional car repairs, and unsettling comments by jarred drivers and passengers.

The need for an effective asphalt maintenance program is paramount for any Navy activity. It is obvious that early identification and subsequent maintenance of asphalt deficiencies will extend the life of the pavement. However, limited resources normally cause these types of maintenance jobs to drop on the public works priority list, and as a result, asphalt concrete distresses grow, major repairs become imminent, and the local natives becomes increasingly restless.

Several techniques exist to correct deficiencies in asphaltic concrete pavements. The deep patching method with a hot plant mix has proven to be the most effective procedure for the repair of severe alligator, edge, shrinkage and slippage cracks, potholes, depressions, and upheavals. While this method provides a more permanent patch, it does require extensive logistic support.

Most shore activities do not have an asphalt plant nor the proper equipment required to make major pavement repairs. Consequently, this work is contracted to firms which specialize in this work. Public works departments normally keep the responsibility of routine maintenance and minor pothole/crack repair in-house. Unfortunately, the extensive use of men and equipment is still required to adequately perform this function.

The public works department at the Naval Weapons Support Center, Crane, Ind., has effectively increased productivity in their asphalt repair program through the use of a small asphalt recycler and compact equipment system. Together, these two units have reduced the number of personnel previously required to make minor pavement repairs, and provided the optimum amount of equipment and material to perform high quality patching.

The asphalt recycler, which is trailed mounted and easily towable by a utility vehicle, provides the capability of hot mix year around. Reclaimed asphaltic concrete is heated by direct fire and mixed in an inclined rotating drum. The propane for the burner is provided from two 100-pound gas cylinders which are mounted at the front of the trailer. In normal use it has been found that the two tanks will reclaim about 38 tons of old pavement before refill is necessary.

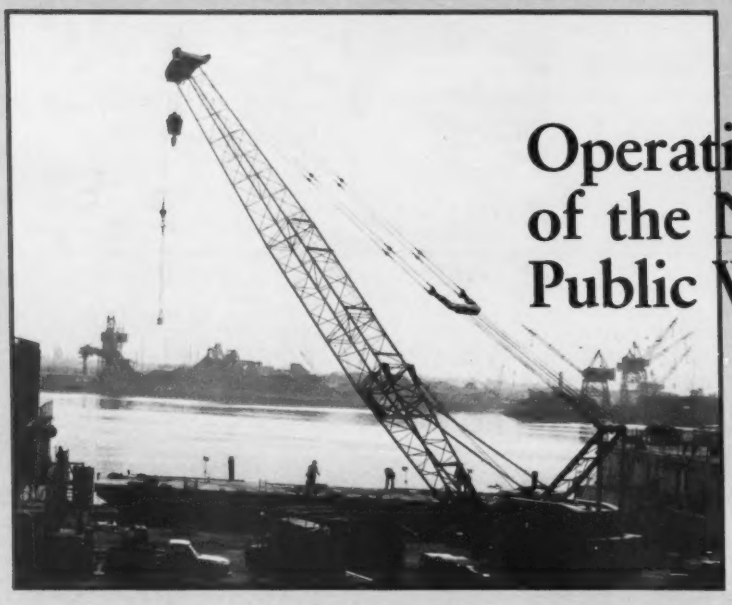
The burner has an adjustable flame and utilizes a pilot light for convenience and safety. In operation, the fire is directed down the center of the rotating drum. Since the heating unit can be manually controlled, a wide range of mix temperatures (200°-300°F) can be achieved. The drum is loaded through a hopper that sets above the burner. The unit intake will accept chunks of pavement up to 17 inches across. Additional oil and aggregate can be fed into the hopper to supplement the recycled mix.

Mixing action is accomplished by use of fixed vanes in the drum similar to that of a concrete mixer. Driven by an 8 hp gasoline engine through a gear reducer, the mixing drum holds a single asphalt batch of 400 pounds and has a continuous production rate of 3-5 tons per hour. The recycled asphalt is discharged through an adjustable chute positioned in the back of unit. This convenient location of the tray enables the mix to be shoveled directly into the repair being made.

The asphalt recycler is complemented with an equipment system that supplies heated tack oil and compressed air to operate a pneumatic tamper and jackhammer. Mounted at the back of a utility truck, the unit obtains the compressed air from an engine driven pump. The tack oil is heated by engine coolant being circulated through a heat exchanger coil in the oil holding tanks. This arrangement allows up to 40 gallons of oil to be heated to a temperature of 150°-200°F. The compressed air and tack oil are fed through hoses on retractable reel systems.

The unit has a control panel that monitors the pressure and temperature in the two tanks as well as separate control valves that allow the operator to regulate flow rates. A spray wand is used for application of the tack oil and a tamper or jackhammer is attached to the compressed air line. The entire package is mounted to the sides of the utility

(Continued page 20)



Operational Profile of the Navy's Public Works Centers

By JOHN E. ROARK
Director, PWC Resource Management Division NAVFAC HQ

• Alexandria, Va.

Public Works Centers (PWCs) are independent naval commands with the established mission of providing a total range of public works services (i.e., utilities, maintenance, housing, transportation, engineering services, and facilities planning support, and other public works) required by operating forces, located in the vicinity of the naval complex served by a PWC.

There are eight PWCs operating under the Navy Industrial Fund (NIF) and one operating under the appropriation accounting system. These activities support major naval complexes in Norfolk, Va.; Pensacola, Fla.; Great Lakes, Ill.; San Diego and San Francisco, Calif.; Pearl Harbor, Hawaii; Guam; Subic Bay, Republic of the Philippines; and Yokosuka, Japan.

PWCs provide public works services to over 2,000 customer com-

(Text continued page 18)

Visitations To Field Operations

Public Works Center Pensacola, Florida

Typical of the eight Public Works Centers (see text preceeding page) operated under the jurisdiction of the Naval Facilities Engineering Command is that serving the naval complex of Pensacola, Fla.

The Pensacola PWC serves the Naval Air Station, Pensacola, which in turn is host to a number of independent commands. The PWC furnishes the station as a whole with utilities, street and runway upkeep, transportation services, and repair and stabilization of buildings, shops, living quarters and public housing units.

The center's responsibilities are likened to that of a small city's public works department including utility distribution plus that of a major real estate lessor.

The Navy's aviation shrine, Naval Air Station, Pensacola –

Aside from the general services outlined, the PWC performs specific repairs, minor construction and modifications for a number of other 'customers' located on the Naval Air Stations. These independent commands include the Chief of Naval Education & Training; the Naval Education & Training Program Development Center; the Naval Aerospace and Regional Medical Center; and the Naval Technical Training Center.

(Far left) PWC/Pensacola has 10 Civil Engineer Corps officers assigned with around 700 civilian employees to perform the multiple tasks. *(Left)* The author checks electric consumption with key civilian employee.

cola — PWC's top client pictured with the *U.S.S. Lexington*

The Public Works Center is presently commanded by Capt. Carl E. Christenson, CEC, USN, with CDR Dorwin C. Black, CEC, USN, as executive officer.

By ENS S. T. ECKEL, CEC, USNR
E.I.T., N.C.
Activity Civil Engineer

(Right, clockwise) Transportation maintenance, stock control of thousands of replacement parts, monitoring responsive utility usage and industrial controls repair, are all in the 24-hour days for public works centers.

Construction Battalion Unit #402, comprising 45-50 Seabees receives technical assistance from the PWC.

Operational profile of PWCs . . .

(Continued from page 15)

mands of which 183 are receiving services in excess of $150,000 annually. These major customer activities include naval station/bases (7); air stations (10); hospitals/dental clinics (8); supply centers/depots (7); shipyards/repair facilities (5); communications stations (8); fleet commands (17); training commands (17); systems commands (5); air reworks facilities; research and development (R&D) activities; ordinance commands and ships; as well as other Department of Defense and government agencies.

The nine PWCs are centrally managed but independently operated. They have evolved as a result of the consolidations of many public works departments directed by the Secretary of the Navy. This has enabled the establishment of a high degree of management commonality and the achievement of considerably economy.

The eight (8) NIF PWCs operate with a permanent capitalization corpus of $15.6 million. The estimated volume of business in recent years has been over a half billion dollars! These services are provided with an assigned civilian strength of about 11,000 employees, supplemented with private contracts of approximately 40% of the volume of business.

NIF PWCs provide about one-third of all Navy public works services. The trend of the navy shore activities is to consolidate and relocate into major naval complexes where PWCs are located continues to increase the requirements for reimbursable and those non-reimbursable services provided by PWCs.

The Naval Facilities Engineering Command (NAVFACENGCOM) is responsible for providing maintenance resource support for shore facilities engineering and planning services, controlled maintenance inspection services, including preparation of annual inspection summaries and consultation services to commands served.

PWCs are managed as a single corporate unit in the same manner as a geographically diversified corporation. NAVFACENGCOM, in conjunction with the assistant secretary of the navy (financial management), has instituted an electronic reporting system, to utilize those same "key measurement indicators" used in today's business world. The NAVFACENGCOM Corporate Management System for PWCs is coupled with worldwide standard PWC organizations and operating procedures. This includes a standard computer supported PWC management system (PWCMS) as approved by the General Accounting Office (GAO).

The future for PWCs appears to be vibrant with challenges and opportunities to improve organizational effectiveness and efficiency in supporting burgeoning workload requirements. For example, the PWC Automated Data System (ADS) Plan has been under consideration since February 1977. When pursued, this plan will extend the capability of the present Public Works Center Management System (PWCMS).

PWCMS is a centrally designed and maintained mechanized information system utilized by PWCs. This operational system is integral to the effective and efficient operations of a $565 million corporation. The system is 12 years old and an ADS plan will modernize PWCMS by the application of mini-computers to process PWC operational requirements in the 1980s.

Also, standardization of Real Property Maintenance Activity (RPMA) operations is a continuing NAVFACENGCOM program. The limited maintenance dollars available can best be used by the PWCs through the design of standard organizations, procedures and systems incorporating modern industrial engineering concepts. In 1965, a standard PWC organization was first introduced. Installation of the mechanized Public Works Center Management System (PWCMS) was then initiated in 1968. A PWC corporate management program followed in 1969.

The need for an effective and efficient system for PWC work management was voiced by PWC commanding officers in the 1973 Corporate Management Workshop. PWC customers were expecting more responsive and predictable service at a lower cost. The Assistant Commander for Operations and Maintenance of NAVFACENGCOM was asked to study the problems and develop recommendations to manage work from the initial request to physical completion and billing.

An initial study proposal was developed by a team from NAVFACENGCOM's public works division and approved by the PWC commanding officers in May 1973. In the following summer, the Production Management System (PMS) at each PWC was studied and results presented during the September 1973 corporate management workshop. A decision was then made to develop the new concept into an operating pilot system with the PWC San Diego selected as the test location.

Development and installation of the pilot system was completed in May 1975 and was designated as PMS Phase II based on the use of modern production management concepts and techniques. PMS Phase I was established as a preparatory step at all other PWCs. Each center has a Phase I plan to make improvements in the management of emergency service, minor, specific and recurring work. The PWCs will realize immediate benefits from recognized improvements. The transition to PMS II from the existing multiple system situation will be more gradual.

The PMS Phase II organization is designed to provide clearly defined functional responsibility and controls for accomplishing the work flow. At present, the operation of the Phase II pilot is being closely monitored at PWC San Diego. Changes are being made to procedures and computer programs to correct system problems as they are identified. The other PWCs are proceeding to accomplish the improvements included in their individual Phase I and II plans. □

Fluorescents On or Off?

Does a fluorescent light have to be turned off for a half-hour before the energy saved equals the energy used in initially energizing the light? Many people think so, but this is a misconception.

The total starting current of a two-tube rapid-start fluorescent light lasts for about one second. The initial in-rush current lasts for only one-half cycle (1/120 second) and has a peak value about five times as large as the steady state peak. This in-rush current does not use a significant amount of energy since it lasts for such a short time. Thus, fluorescent lights have to be turned off for only *one second* in order to save the amount of energy that will be expended when the lights are initially turned on again.

Detailed economic studies of trade offs between fluorescent lamp replacement and electric costs have shown that anytime a room is to be vacated for more than a couple of minutes, the fluorescent lights should be turned off. Therefore, turning off lights as you leave a room is a good habit to develop.

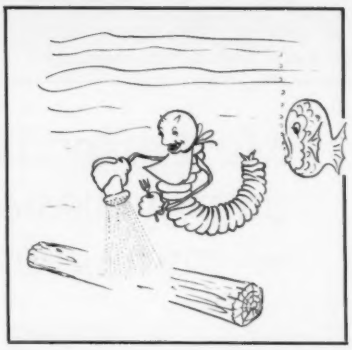
What about other types of lamps? Since short operating periods have little effect on the life of incandescent lamps, they should *always* be turned off when a room is vacated.

High intensity discharge (HID) lamps, such as mercury vapor, sodium vapor, and metal halide, require several minutes to warm up. In addition, when they are turned off, they need several minutes to cool off before the ballast will restart them. Consequently, HID lamps should not be turned off unless the shut-off period is longer than 20 minutes.

Additional information may be obtained from Willima Pierpoint, Code L62, Civil Engineering Laboratory, Naval Construction Battalion Center, Port Hueneme, CA 93043; Autovon 360-5778, FTS 799-5778, Commercial (805) 982-5778.

This section of The Navy Civil Engineer is designed for ready exchange of better ways to perform Public Works functions. Readers who desire additional information are urged to contact the contributor directly for specific details. Contributions are urged from field installations and should be submitted directly to the magazine: Editor, The Navy Civil Engineer, code C20M, Naval School, Civil Engineer Corps Officers, Port Hueneme, CA 93043; Commercial (805) 982-3104.

Improving Resistance To Marine Borers



The Navy uses wood extensively for marine piling despite the fact it is subject to attack by marine borers. Resistance to marine borers can be improved markedly by impregnating the wood with certain toxic wood preservatives. However, there is controversy over whether the metallic salts treatment or dual treatment (metallic salts, kiln drying, and creosote) increases the brittleness of the wood.

At the present time the American Wood Preservers' Association recommends dual treatment (or a 2.5 lb/cu ft metallic salts treatment) for piles that are to be driven in areas of severe marine borer hazard because timbers so treated are superior to creosote-treated piles in resistance to marine borers.

Because the major use for wood piles in the Navy is fender piles, any significant loss in strength by preservative treatment becomes very important to the design and maintenance of these energy-absorbing systems. Therefore, the Civil Engineering Laboratory has had prepared Douglas fir and southern pine piling with different treatments and had these pilings tested for changes in typical properties at the Oregon State University. Full-size 20-foot sections were tested in flexure to failure, and 4-foot butt specimens of the same piles were compressed longitudinally to failure.

There was a definite decrease in the mechanical properties of the wood with treatments, some as high as 55%. Also, it was found that kiln drying was more deleterious to loss in mechanical properties than strictly air drying between treatments.

If piles are to be used mainly in fendering systems where strength is an important factor, then creosote-treated piles should be considered.

If the examination of historical records of installed piles indicates a high degree of biological activity, then a careful comparison of expected life increase with the dual treatment versus loss of strength and additional cost due to the dual treatment should be made.

Since historical data are very important in determining which treatments to use, accurate records should be kept of randomly placed pile treatments and of installation and removal dates so that better selections can be made in the future.

Additional information may be obtained from T. Roe, Jr., Code L52, Civil Engineering Laboratory, Naval Construction Battalion Center, Port Hueneme, CA 93043; Autovon 360-4772, FTS 799-4772, Commercial (805) 982-4772.

more about potholes *(continued from page 14)*

truck, leaving the bed clear to store additional tools or materials. An electric-hydraulic dump system can also be adapted to the bed of the truck to assist in the unloading of aggregate, sand or old pavement chunks. The unit, including the lift system, can be mounted and installed by two mechanics in approximately two days.

It has been found that a crew of two men is adequate to operate the recycler and compact equipment system. This consists of a working crew leader and a helper. The crew leader should completely understand all aspects of the equipment being used and have knowledge of patch procedures and asphalt mix characteristics. The knowledge of asphalt mix formulas is most beneficial, should additional asphalt cement, aggregate, or fines be required to increase the quality of the recycled mix. It should be pointed out that all asphalt repair contracts at Crane now require the contractor to stockpile old pavement that has been removed from the job site. The reclaimed pavement provides the raw material necessary for the recycling process.

Over the past two years, these two units have been used extensively over the 170 miles of paved roads at Crane, where harsh winters and heavy industrial traffic have provided ideal conditions for utilizing these pieces of equipment. The ease of mobilization and demobilization, combined with the ready availability of hot mix, has enabled the public works road crew to make high quality patches on the 100 square mile base on short notice.

While no formal testing program has been instituted, a survey of repairs made to date indicated no failures or subsequent rework of the patches. Granted that a significant factor in the success of this maintenance program is the skill and techniques employed by the repair crew, the result is that repair costs are down because of significant reductions in logistic support.

In anyone's vocabulary, that's productivity. □

Most effective energy management — management action!

LT WILLIAM W. COLLINS, CEC, USN
E.I.T., Mass.

• Charleston, S.C.

Representatives of the naval shore establishment are now alerted for further technical retrofit to improve energy conservation. Now that all the "easy" gains have been made with storm windows, insulation, and interior temperature adjustments newer technologies are being sought.

The stage is being set for advanced energy recovery systems, modified HVAC and electrical systems, and energy monitoring control systems (EMCS). The anticipated gains from these complex engineering solutions are, however, short circuiting local management initiatives to conserve! Sophisticated plans are de-emphasizing and indirectly interfering with local implementation of energy monitoring and control. Considering the observed state of repair of Naval Facilities, it is the fear of this author that these new technological solutions are tantamount to rigging a pea-shooter with a telescopic lens.

The greatest energy savings will come instead from increased maintenance spending and local management initiatives.

There are not enough dollars available to maintain basic equipment. During FY79 at many major commands, new day-night temperature setbacks were rendered ineffective when connected to heating systems that were marginally functional because of improper maintenance. Ironically, the same year with no projected increases in maintenance dollars, the emphasis on EMCS was continued. As a result, it soon may be proven that hooking up EMCS to faulty pumps and valves saves neither energy nor dollars.

Energy was conserved, nevertheless, at many commands last year with local initiatives. Effective building manager organizations made specific persons responsible for specific actions in specific buildings. Through local chain of command, energy questions were answered and responsibility enforced. The organization worked because CEC officers Line and Supply Corps officers mobilized their collective talents and resources.

At the Naval Administrative Command, Great Lakes, a five year maintenance plan was developed that allocated dollars for each facility according to an algorithm combining: maintenance backlog, annual energy consumption, and command interest.

"Out of sight — out of mind" maintenance problems affecting energy consumption could no longer be overlooked. The algorithm readily established priorities and the minimum level of funding needed to affect significant repairs may be tempting as the solution to energy problems of the naval shore establishment but public works officers must not depend on complex technical solutions.

As was stressed at the First International Conference on Energy Use Management, Tuscon, Arizona, in October 1977, there is a need for the manager who can deal effectively with energy matters on several fronts at the same time. The challenge of the 1980's will be to manage *all* resources in effectively conserving energy. □

NAVY ENVIRONMENTAL AND ENERGY SUPPORT ACTIVITY

By CDR LEE R. BOHNING, CEC, USN
P.E., Fla.
And LCDR JOHN P. COLLINS, CEC, USN
P.E., Va.

The Chief of Naval Operations approved the formation of the Naval Energy and Environmental Support Activity (NEESA) effective 1 July 1980 which combines the functions of the Naval Nuclear Power Unit (NNPU) and the Navy Environmental Support Office (NESO).

All programs under the sponsorship of the Assistant Commander for Energy and Environment are merged in this Echelon IV activity located at the Naval Construction Battalion Center, Port Hueneme, California.

NEESA provides worldwide support to naval activities in the areas of energy, environmental protection, and occupational safety and health. A Civil Engineer Corps commander heads the 5 Civil Engineer Corps officers, 3 Medical Service Corps officers, 32 Seabee billets, 72 civilian employees.

In the beginning . . . Naval Nuclear Power Unit

The Naval Nuclear Power Unit (NNPU) was commissioned at Fort Belvoir, Va. on 3 August 1960 to provide field services for the Naval Facilities Engineering Command in acquisition, operation, and support of nuclear shore systems. The primary mission of NNPU was to support and operate the PM-3A Nuclear Power Plant at McMurdo Station, Antarctica. The PM-3A was installed at the McMurdo Station by Seabees of Mobile Construction Battalion One and NNPU early in 1962 and it operated successfully for 11 years before being closed in 1973.

The Unit's mission had been expanded in 1965 to provide field management and support of radioisotope thermoelectric generators (RTGs). These relatively low-power (½ watt to 100 watts) RTG units were used for a variety of undersea and remote site naval applications requiring reliable unattended power.

In 1971, the unit's mission was further expanded to provide technical advice and assistance to naval commands and fleet operating forces in radiological affairs support matters. The technical assistance, on matters other than nuclear propulsion and nuclear medicine, is provided to activities using radioactive materials and sources and radiation producing devices.

In 1974, to capitalize on the skills of the highly trained Seabees of NNPU, NAVFACENGCOM assigned additional responsibility for field engineering and support of the Mobile Utilities Support Equipment (MUSE) program. The unit manages an inventory of over 300 pieces of equipment. Seabee technicians deploy worldwide to install MUSE systems and train activity personnel in operation and maintenance.

In 1976, the unit moved from Fort Belvoir, Va., to Port Hueneme, Calif. During its 20-year history, the Naval Nuclear Power Unit has been awarded two Meritorious Unit Commendations.

And ten years later . . . Navy Environmental Support Office

In 1971, the Navy Civil Engineering Laboratory developed the Naval Environmental Protection Data Base to provide support to naval ships, aircraft, and shore installations. The initial information-oriented system evolved in 1974 into the Naval Environmental Protection Support Service (NEPSS). The NEPSS is a centrally funded organization providing a full range of management and engineering assistance to Naval

(Continued from Preceding page)
commands in environmental protection. The Navy Environmental Support Office (NESO) was formed in 1974 as a department of the Construction Battalion Center, Port Hueneme, to serve as the NEPSS' executive manager and to assist major claimants and activities with specialized engineering analyses.

The managerial and engineering capabilities were cited in November 1977 with NAVFACENGCOM taked NESO with assistance in developing the Energy Engineering Program. In 1979, NESO's charter was expanded to provide information and engineering support to the Navy's shore facilities energy conservation program. In 1980, NESO initiated management support for the Navy's Occupational Safety and Health efforts.

During its ten-year history, the NESO has shared in one Meritorious Unit Commendation.

And finally together . . .
Naval Energy and Environmental Support Activity

The decade of the 80's begins with NNPU and NESO following similar courses — both with expanding responsibilities in highly visible NAVFACENGCOM programs. Their mutual interests in energy and occupational safety and health as well as the complementary aspects of the environmental program, provide a basis for a dynamic new organization. Changing programs in energy, environmental protection, and occupational safety and health present difficult challenges. The Naval Energy and Environmental Support Activity expects to enhance the Navy's capabilities to respond to these challenges. The NEESA motto — "Responsive Action" — commands no less.

Radiological Affairs

LCDR KEN GROVES, MSC, USN

The Radiological Affairs Support Office (RASO) has responsibility for ensuring implementation of a broad-based radiation safety program for the Naval industrial community. Included in this area of responsibility are the Naval shore establishments and units of the operating fleet. The Radiological Affairs Support Office's involvement extends to all sources of radiation excluding only those associated with the Naval Nuclear Propulsion Program and those activities managed by the Bureau of Medicine and Surgery.

These activities include over 150 Navy and Marine Corps commands. The four major areas of RASO assistance are concentrated in the following functions: on-site radiological technical assistance visits; coordination of all Nuclear Regulatory Commission licenses held by Naval activities; design and design review of shielding installations at both shore commands and fleet activities; and radiological safety training.

Radiological Technical Assistance Visits

Because of the size and scope of its mission, the Navy uses a great many ionizing radiation sources. These include sealed and unsealed radioisotopes, industrial x-ray units, analytical x-ray apparatuses, particle accelerators, electron beam welders, electron microscopes, and radioactive materials in various Navy stock

Figure 1

CNO
Chief of Naval Operations

CNM
Chief of Naval Material

NAVFACENGCOM
Naval Facilities Engineering Command

NEESA
Naval Energy and Environmental Support Activity

Administration

RASO	MUSE	NESO
Radiological Affairs Support Office	Mobile Utilities Support Equipment Office	Navy Environmental Support Office

NAVAL AND MARINE activities requiring use of ionizing radiation are visited by three experts of the Radiological Affairs Support Office who determine local safety program needs.

items. RASO has a staff of highly trained and experienced health physicists and technicians who provide extensive on-site visits to Navy activities which possess or use these sources of ionizing radiation.

RASO staff members assist commands to comply with pertinent Federal regulations, Navy directives, and other established standards. Each year about 40 Navy and

Marine Corps activities are visited by assistance teams who perform the following on-site technical services:

- Evaluating overall radiation programs;
- Conducting radiation safety surveys of all ionizing radiation sources and facilities;
- Evaluating and providing advice and assistance for the bulk storage, transshipment, and disposal of radioactive materials;
- Furnishing consulting services to personnel of responsibility on aspects of radiation safety;
- Evaluating radiation from accelerators and other machines capable of producing ionizing radiation;
- Instructing personnel in procedures for the safe use of radioactive material and machines which produce ionizing radiation; and
- Evaluating compliance with the Bureau of Medicine and Surgery managed Radiation Health Program.

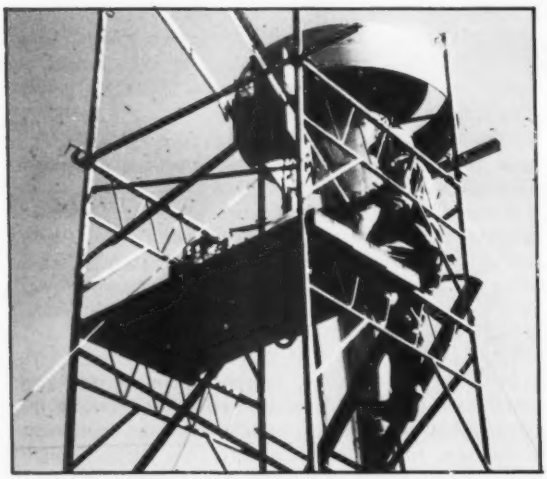
NRC License Coordination

All applications and amendments for Nuclear Regulatory Commission Licenses are routed to the Nuclear Regulatory Commission via RASO for review.

Proposed and final Nuclear Regulatory Commission rules are reviewed by RASO for effects on Naval activities and guidance is provided for interpretation of the regulation.

RASO notifies activities in advance of license expiration dates and assists in preparing the license renewal application. Activities are advised on methods for effective compliance with the regulations.

Approximately 170 licenses for use of radioactive material are issues to 107 Naval activities by the Nuclear Regulatory Commission. During 1979, for example, 47 new and renewal license applications and 66 amendment applications were routed via RASO to the Nuclear Regulatory Commission.



AIR SOURCE ANALYSIS is accomplished by a NEESA team member to determine breathing and aural atmospheres at a naval industrial activity.

Shielding Installation Reviews

When new facilities are built or existing facilities are modified in ways which might reduce radiation protection, RASO reviews building plans and the use of the proposed radiation source. RASO also designs radiation shielding and provides recommendations for electrical safety systems designed to prevent inadvertent personnel exposure. Facilities reviewed include those using medical or dental x-ray machines; industrial radiography installation using large x-ray machines and accelerators; as well as facilities utilizing isotopic radiography sources such as cobalt-60 and iridium-192.

Radiological Safety Training

RASO has developed and tailored a number of training programs for a wide range of radiation safety applications. Understanding that both small and large programs exists in the Naval community has required that a broad based radiation safety training program be developed.

The variation of needs for different levels of Radiation Safety Officer training throughout the industrial, research and training areas of the Navy has been recognized and met with the development of the two-week Radiation Safety Officer Course. The increase in demand for well-trained radiation safety personnnel rquires continued emphasis on high quality Radiation Safety Officer training in the Navy and as a result this training course is continually updated.

Other radiological training in which RASO participates includes: Radium Removal Operations for the Inactive Ship Maintenance Facilities; radiation safety training for the use of Nuclear Moisture/Density Meters; and most recently, a three-day Radiation Safety Officer Refresher Training Course. Additionally, RASO assists other activities by reviewing those training courses which include radiation safety as part of their curriculum.

Safety and Health

JOY ERDMAN

The Navy Occupational Safety and Health (NAVOSH) program has emerged as a major multi-million dollar effort to bring naval shore activities into conformance with accepted health and safety standards. The importance of an occupationally safe and healthful workplace for Federal workers was recognized in Executive Order 12196 of February 1980. NESO serves as the project information manager and, through the Aircraft Environmental Support Office, conducts engineering analyses in the breathing and aural atmospheres at industrial activities to determine the degree of compliance necessary in project development.

NAVOSH Deficiency Abatement Program

Through the NAVOSH Deficiency Abatement Program, the Navy intends to eliminate most occupational safety and health hazards at shore activities by

(Continued next page)

(Continued from preceding page)
engineering control. To accomplish the purpose, the Occupational Safety and Health Control Report (OCR) provides management information to activities, major commands, NAVFACENGCOM, the Commandant of the Marine Corps, and the Chief of Naval Operations on all NAVOSH projects. A computer-generated hazard control assessment code is used to assist major claimants in assigning priorities to the projects.

The entire system is maintained and updated directly by NAVFACENGCOM's Engineering Field Division personnel via remote terminals. About 50 elements are available to query. As of April about 650 projects worth $17 million have been entered into the relatively new effort.

Facility Engineering Studies

Equipment and expertise assembled to solve environmental problems is available to measure and analyze NAVOSH problems at shore activities where specialized equipment is not available to the local industrial hygienist or safety official. Measurements of suspended air particles have been conducted at the North Island Navy Air Rework Facility, San Diego, Calif., and of noise and vibrations aboard ship.

As a link between identification of occupational safety and health hazards and correcting them, NESO reviews reports produced through the Navy Inspector General's Navy Occupational Safety and Health Inspection Program (NOSHIP) and then communicates with the relevant Navy activity to train and facilitate submission of NAVOSH projects.

Information/Technology Transfer

The NAVOSH management-by-objectives (MBO) report summarizes safety and occupational health and is an essential tool used by DOD to evaluate and compare the military departments. NESO produces this report semi-annually, tracking Navy progress in protecting personnel from accidental death or illness, safeguarding weapon systems, material and facilities against accidental destruction or damage. Integrated in this report is safety information from the Navy Safety Center, health information from the Navy Environmental Health Center, and engineering information from the EFDs and NESO.

NESO provides legal occupational safety and health information as inquiries arise, as well as through a *NAVOSH Legal Reference Booklet.*

Responding to special studies for higher management levels, NESO began studying military cancer death in the last three years to identify an association between types of cancer and occupation specialty, duty station, age or pay.

A workshop on the NAVOSH Deficiency Abatement Program was provided to the Engineering Field Divisions in December 1979 and to the major claimants in January 1980.

Mobile Utilities Support Equipment

By LCDR MICHAEL E. FOSTER, CEC, USN
P.E./La.

The Mobile Utilities Support Equipment (MUSE) Department provides portable equipment for interim support of utilities deficiencies in the Navy. Typical deployments support cold iron, (i.e. ships with dormant power) submarine testing, ship repair and maintenance, utility plant failures or scheduled overhauls, and any new missions for which there is insufficient time to provide utilities support through regular methods.

The MUSE inventory has a current plant value of $100 million, consisting of 750 to 2500 kilowatt gas turbines and diesel-driven generators; 1500 to 5000 kilovolt-ampere electrical substations; and 10,000 to 60,000 pounds per hour steam plants.

Field Assistance Capability

At any given time, the MUSE Department typically has over 150 units scattered around 40 locations in the world. MUSE department Seabees visit these sites and document equipment condition, inspect operation and maintenance practices, and provide on-site assistance and training.

These are currently 32 Seabee MUSE technicians. Selection for the program is very competitive, and once selected, candidates must successfully complete a year of extensive technical schooling in the Primary Power Production Specialist Course at Forth Belvoir, Virginia, before being awarded their specialty classification.

The majority of MUSE technicians are concerned with equipment installation, annual maintenance and termination inspections, and response to requests for assistance on problems encountered with the equipment in the field. In this latter capacity, they perform much like a manufacturer's technical representative and usually have attended specialized training given by the manufacturer of the equipment.

Installation inspections involve assitance in initial

setup and testing of the equipment, familiarization training of the using activity's operating and maintenance personnel, and documentation of equipment condition and spare parts inventory. Annual maintenance inspections ensure that the preventive maintenance systems are being utilized and that equipment deficiencies are identified for proper corrective action. Termination inspections document equipment condition at the end of deployment and identify discrepancies which must be corrected, at the using activity's expense, to make the equipment redeployable. The cost of these inspections is borne by the MUSE department, and the return on this program has been increased equipment life and reliability, as well as timely identification of maintenance problems before they result in costly repairs.

The MUSE Department also provides, on a cost reimbursable basis, a rapid response to activity technical assistance requests. For instance, a recent failure of the diesel engine on a 750-kW generator providing cold iron support at Naval Forces Korea, Detachment Chinhae, required replacement of the entire engine. A three-man technical assistance team accompanied the air shipment of the replacement engine and made the unit operable again within five days of arrival at Chinhae, reducing operational risk.

A TEMPORARY ELECTRIC power is Seabee-installed in South Korea to support a ship docked without internal power generation (cold iron.)

Equipment Development

MUSE units are designed to be self-contained, transportable, and of universal application while in remote locations. MUSE department engineers provide "total life" management of their equipment from initial conceptual development, equipment procurement and overhauls and finally to disposal methods. All purchase descriptions and technical support of procurement and overhaul contracts are performed by MUSE department personnel, with contract administration accomplished through NAVFACENGCOM Contracts, Davisville, R.I. With the contracting office on the East Coast, MUSE on the West Coast, and equipment procurement and overhaul contractors at various points in between, coordination of effort and adequate communication among MUSE, Davisville Contracts, DCASMA, and the contractor is particularly demanding.

Department technicians assist MUSE engineers in developing purchase descriptions, reviewing design proposals, and witnessing testing at the manufacturer's plant of new equipment. Practical experience gained by these technicians in previous field installation and troubleshooting assignments provides an excellent complement to department engineers in the area of equipment operations and maintenance. The close relationship between engineers and technicians has proven effective in avoiding built-in maintenance problems and also insuring quality workmanship.

MUSE Utilization Guidance

MUSE is often the only, or the most economical, solution to utility shortage problems. Total costs to the Navy must be considered in comparing MUSE with commercial rentals or other alternative solutions. However, only costs usually incurred by the using activity are normal installation, operation, maintenance, and any repairs required to bring equipment back to the condition in which it was received. Transportation costs, as well as major overhauls, are funded by the MUSE department.

Environmental Protection

By EARL H. MOSER, JR.

Federal law requires the Navy to protect and enhance the quality of the environment through a comprehensive protection program. Executive Order 12088 of 15 October 1978 makes it clear that federal facilities must be designed, constructed, managed, operated, and maintained in compliance with federal, state, and local requirements for the prevention, control, and abatement of environmental pollution.

Pollution Abatement Efforts

Through the Chief of Naval Operations, the Chief of Naval Material has the responsibility for developing, operating, and maintaining a comprehensive environmental protection program to support a commanding officer of an installation who is the responsible official for compliance with laws and regulations.

The Naval Facilities Engineering Command (NAVFACENGCOM) and its six engineering field divisions

(Continued on next page)

(Continued from preceding page)

(EFDs) accomplish these aims through the Naval Environmental Protection Support Service (NEPSS).

The NESO serves as executive manager of the NEPSS to coordinate the efforts of 135 individuals at EFDs, the Ships Environmental Support Office and the Ordnance Environmental Support Office, the Aircraft Environmental Support Office, and the Marine Environmental Support Craft.

- **Water Pollution**

On a continuing basis, NESO develops guidelines and impact documents to keep shore activities aware of changes made to water regulations. Guidelines have been prepared for characterizing industrial waste sources and coordinating pretreatment requirements with municipal sewage agencies. On request, specialists assist other components of NEPSS and the shore activities with complex water problems; quality control reviews of wastewater laboratory analysis practices; and groundwater pollution studies. Future emphasis will be directed toward minimizing wastewater discharges requiring pretreatment.

- **Air Pollution**

Air pollution permits require demonstration of compliance. Conversions of boiler systems to coal require new air pollution strategies and attendant engineering development. States which are threatened by withdrawal of federal funds because of inadequately controlled air pollutants will likely become more aggressive in enforcement and standard setting. NESO specialists will continue to assist activities with compliance problems by performing source emission tests, ambient air monitoring studies, and combustion processes analysis.

- **Hazardous Materials Control**

Federal and state regulations restrict and control all forms of hazardous waste. For several years NESO has maintained two documents to assist shore activities with hazardous material. The *Hazardous Waste Disposal Guide* provides directions to commanding officers for defining the size and complexity of hazardous waste problems and guidance for processing and disposing of such wastes. The other document covers handling and disposal guidance for the 5,500 hazardous stock items listed in th Naval Supply Systems Command's *Consolidated Hazardous Items List (CHIL).* Guidance provided in these publications is reviewed and updated on a regular basis. Comprehensive guidelines developed by NESO for a new Hazardous Materials Environmental Management Program have recently been issued by the Chief of Naval Operations. This program covers shore activity development of hazardous waste management plans, hazardous material spill prevention and countermeasures plans, and hazardous material contingency plans.

A Navy Assessment and Control of Installation Pollutants (NACIP) program is rapidly developing. The program will identify past hazardous waste disposal practices that may be affecting present health and environmental conditions at Navy activities. Starting in Fiscal Year 1980, specialists began investigating past disposal practices through personal interviews, examinations of old activity records and preliminary field investigations. If a potential health or suspected environmental problem appears, the team will recommend followup efforts to further define and correct the problems.

- **Oily Wastes/Waste Oil Reclamation**

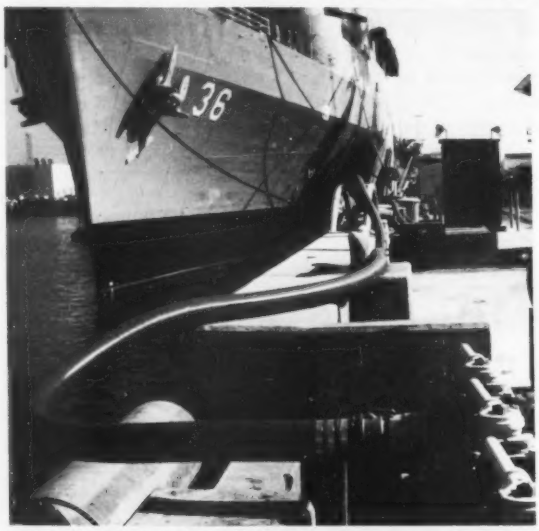
Oil pollution abatement efforts by the Navy will not only provide for a cleaner environment but will reduce the nation's dependence on foreign oil. Current Navy ship's procedures reduce the generation of oily wastes and store, process, and unload waste to shore facilities. Waste oil collected from ships and shoreside industrial operations will be processed for use in Navy power plants. Estimates vary between 5 and 13 percent of the Navy's shoreside demand for fuel oil can be satisfied through the use of reclaimed petroleum products. NESO provides Navywide coordination for the oil pollution abatement program.

- **Ship Discharge Limits**

Prevention of ship sewage discharges near the shore requires both ship and shore coordinated actions. Within the 3-mile limit ships collect and hold untreated sewage for transfer to shoreside sewer facilities. By April 1981, all Navy ships, service craft, and boats are to discharge untreated sewage ashore. In total, 497 ships and submarines and 385 piers will have to be outfitted with sewage facilities. NESO maintains and updates Navy management information reports on the progress toward meeting the April 1981 goal. Current investigations underway through NESO involve the availability of environmental facilities at other U.S. ports utilized by Navy vessels.

- **Solid Waste**

Recent legislation considers solid waste a resource. Three principal regulations directly affect management of solid waste at shoreside facilities. One covers reduction of solid waste disposal by separation of high



SEWAGE DISCHARGE from ship to shore is a requirement to be met by all naval vessels by April 1981 and requires fitting 497 ships and 385 piers with proper equipment to meet deadlines.

INDUSTRIAL WASTE disposal, which could contain harmful chemical ingredients, requires constant monitoring and recommendation for new disposal methods by NEESA.

grade materials. Another addresses recovery of heat and energy resources from unreclaimable wastes. The third implements the use of the best available management practices at sanitary landfills. NESO provides source separation economic analysis criteria to shore facilities and conducts specific economic analysis and solid waste surveys. Under Environmental Protection Agency (EPA) regulations, the Navy is the lead agency in eight regional areas to evaluate resource recovery alternatives for nearby Federal facilities.

NESO also develops guides for Navywide use in solid waste management. One is a *NEPSS Solid Waste Management Program Guide.* Another covers activities making resource recovery studies. A guide has also been issued for conducting shore activity source separation studies.

- **Pesticide Environmental Management**

Pesticides became a strong environmental concern in 1975. The Navy's pesticides program now includes pesticide handling and disposal guidance, replacement of inadequate pest control shops, and pesticides' residue sampling to determine the existence of pollution problems. Guides have been provided to naval shore activities for pesticide spill prevention, spill contingency planning, emergency response assistance, and spill cleanup and disposal. NESO has also produced a movie depicting environmentally safe and legally required procedures for the control and cleanup of small pesticide spills.

- **Natural Resources Inventory**

An inventory of natural resources has been initiated by the Navy to meet the requirements of environmental laws and regulations that effect local activities' ecology. Diverse physical and biological resources exist on Navy properties and accurate information is necessary to manage and protect these resources. NESO coordinates this Navywide effort. Current work involves evaluations of available information, determination of data needs, and development of data gathering and storage procedures. Future plans envision an operational inventory system in 1981. This sytem will help assure that naval operations are consistent with regional and national environmental and ecology goals.

A quarterly newsletter of timely information — *The Clean Slate* — is published for the environmental program. It also contains current information of the NAVOSH program and the ship/shore program. A *Directory of Environmental Contacts* is maintained for the Navy Environmental Protection Program.

Technical information bulletins describe innovative techniques; procedural guides involve mechanical or utility systems; and standard operating procedures give detailed instruction for using ADP support packages.

NESO supports its sponsors with feedback and data for review by higher authority. Environmental management-by-objective review packages are prepared for presentation by DOD. Management indices are developed including program performance reviews and responses to special inquiries.

Energy Conservation

By PHILIP R. WINTERS
P.E./Calif.

Reliable estimates indicate the United States can save more than 40% of current energy consumption by conservation. The established federal goal 20% reduction

during the 1975-1985 decade entails half of the potential gains achievable.

To accomplish this goal, a new ethic must develop which partly accounts for NESO's energy conservation involvement, that includes technology transfer, engineering development, and management of information systems.

Energy Conservation Engineering

NESO engineers visit activities to tune boilers, identify project requirements, and develop scopes-of-work for required contractual efforts. Typically, a team demonstrates immediate fuel savings of from 3 to 8 percent and will recommend additional work that equals or betters these figures. Still further gains can be achieved when boiler operators fully understand the consequences of minor adjustments. NESO conducts four to six Boiler Efficiency Seminars for about 150 plant operators every year.

Air-conditioning systems also provide potential for large fuel savings with relatively small investments. Some of the tips provided in the *Air-Conditioning Tune-Up Procedural Guide* developed by Southern Division NAVFACENGCOM and NESO include cleaning condensors, controlling make-up air and adjusting thermostats. NESO engineers also visit activities to assist in performing air-conditioning tune-ups or in developing scopes-of-work for contractual efforts.

Shipyards and air-rework facilities use significant quantities of energy. NESO engineers conduct industrial energy conservation surveys to identify immediate energy savings such as at the Naval Shipyard NSY Long Beach, Calif. where installing lighting controls in one building could save $45,000 annually! NESO engineers use sophisticated instruments to pinpoint waste and to gain precise information on which to base conservation actions.

Department of Defense policy requires a determination of the savings attributable to retrofit construction projects funded under the authority of the Energy Conservation Investment Program (ECIP). NESO engineers assist EFDs with pre- and post-construction monitoring and engineering analysis to demonstrate the success of energy conservation projects.

Information Management Systems

Each of the facilities engineering and management efforts require computer support to manage the extensive involvement with worldwide naval activities. The Facilities Support Office (FACSO), Port Hueneme, provides major computer support under the direction of ENSO data management specialists.

- **ECR**

The energy conservation program depends on the Energy Control Report (ECR) to track project submittals, funding, and construction of retrofitted facilities for conservation achievements. As of April 1980, the system contained approximately 935 projects worth approximately $82 million. Information in ECR provides a mean for Navy managers to keep abreast of project status and accounting data.

- **EAR**

The Defense Logistics Agency established the Defense Energy Information System (DEIS) in 1974 to collect and process energy consumption data. Department of Energy (DOE) regulations issued subsequently require energy usage to be normalized to building square footage. To meet these new requirements, NESO developed and now maintains the Energy Audit Report (EAR). By interfacing with the Naval Facilities Assets Data Base maintained at FACSO for square footage data, NESO provides an indication of activity conservation performance.

To facilitate Navy shore activity DEIS reporting procedures, the NESO, since January 1980, processes about 300 naval messages each month and assures that consumption data for shore activities are correct before formatting and transmittal to the Defense Logistics Agency.

- **Combustion Systems/Air-Conditioning Systems**

Energy conservation projects entail work on equipment and other facilities found aboard Navy activities. Foremost among these are boiler plants and air-conditioning systems. Because of the large number of these systems owned by the Navy, the NESO maintains computerized inventories of boilers and air-conditioning units to help managers select candidate systems for conservation actions. In this case, data also becomes part of the Navy Facilities Assets Data Base and are available for purposes other than energy conservation.

Information/Technology Transfer

Facility engineers and managers must respond to externally created requirements. Evolving regulations are analyzed by the NESO legislative coordinator who issues information bulletins about current legal situations.

The NESO has developed a newsletter — *Energy Matters* — on current events; procedural guides involving mechanical systems such as air-conditioners; and, information bulletins describing innovative techniques.

Finally, the NESO is responsible for developing management indices other than those provided by data processing techniques. These indices include a *Federal Directory of Energy Contacts*, a *Management Decision Guide* which covers several aspects fo the Energy Engineering Program, and development of new ports as requirements are issued by regulatory agencies or are identified by Navy management.

MISSING PAGES ARE INDEX PAGES
WHICH HAVE BEEN PHOTOGRAPHED
AT THE BEGINNING OF THE VOLUME(S)

Naval Facilities Engineering Command

SITUATION REPORT

CLASSIFICATION OF CIVILIAN POSITIONS - Authority to classify GS1 through GS15 and Federal Wage System positions will soon be delegated to designated Commanders and Commanding Officers of NAVFAC field activities by NAVFACINST 5310.6C. The classification of GS13, 14 and 15 positions will be initially subject to a stringent Headquarter's position management and position classification pre-audit requirement to insure proper application of the delegated classification authority. The authority to classify GS13, 14 and 15 positions is the culmination of an all out effort by NAVFAC to secure this authority, which was previously held by the Naval Civilian Personnel Command.

(NAVFAC Code 09M)

FLEXITIME - NAVFAC Headquarters has requested CNO approval of flexible work hours for a 6-month trial period. The plan would retain the standard 8 hour day/40 hour week, but allow most employees to schedule their workday during a 0700-1730 range. All employees are required to be on duty during "core times" of 0900-1130 and 1230-1530 unless they are on leave or travel. CNM has favorably endorsed the request; final approval from CNO is partially dependent on okays from SECNAV staff and GSA. If approved, the plan would probably go into effect during Fall, 1980.

(NAVFAC Code 09M)

SEABEE ASSISTANCE TO NAS CORPUS CHRISTI - On 13 August 1980, thirty-five Seabees from NMCB-133 deployed from Gulfport, Mississippi, by aircraft to assist the Naval Air Station, Corpus Christi, Texas, in its efforts to recover from extensive damages caused by Hurricane Allen. Approximately twenty additional Seabees from NMCB-133 soon joined them. Consisting mostly of men in the CE, BU, and SW ratings, the Seabees immediately began making repairs to the electrical distribution systems in the station family housing areas and restoring power to individual housing units. They also made temporary roof damage repairs to ten large hangars.

(NAVFAC Code 06)

About the Naval Energy and Environmental Support Activity

In the summer of 1978 "Speaking From Topside" article, I discussed the reorganization of the Facilities Management Department (Code 09B). As part of this realignment, Code 11, the Assistant Commander for Energy and Environment, was created. As I stated at that time "Energy, utilities, MUSE, and environment are closely related functions and in many cases, interwoven."

This inter-relationship of functions under Code 11 established the logic for joining the Naval Nuclear Power Unit (NNPU) and the Navy Environmental Support Office (NESO) into a single activity, the Naval Energy and Environmental Support Activity (NEESA). This union brings together critical Navy support functions in the areas of energy, environment, and occupational safety and health.

In energy, NEESA unites NAVFAC efforts in mobile energy support and energy conservation. The well-respected MUSE program will continue to provide equipment management and field technical assistance to meet Navywide power requirements. In addition, NEESA will actively support the Navy's energy conservation initiatives. Teams of field engineers will conduct energy conservation pre-surveys, boiler effeciency seminars, and perform energy consumption monitoring. NEESA will also address Navywide issues of energy training. In the area of management support, NEESA will report on all energy conservation projects, receive all Navy DEIS II data, and provide activities with periodic energy consumption status summaries.

In environmental protection, NEESA will continue and expand upon the previous role of the Navy Environmental Support Office. Air emission testing, wastewater monitoring, management information reporting, and executive management of the Naval Environmental Protection Support Service (NEPSS) will continue. In addition, through a new hazardous materials division, NEESA will provide responsive technical assistance in this important environmental area.

In occupational health, NEESA brings together the radiological safety programs of the Radiological Affairs Support Office (RASO) and those of NAVFAC's Occupational Safety and Health Deficiency Abatement Program. The Navy's Occupational Safety and Health (NAVOSH) Program is an emerging effort of future significance to NAVFAC facilities, planners, constructors, and managers.

One of my greatest pleasures as Chief of Civil Engineers is helping chart NAVFAC's response to new challenges and changing times. Clearly, energy, environment, and occupational health are three of the upcoming programs of the '80's. I am confident that the charter and visibility of the Naval Energy and Environmental Support Activity will enable NAVFAC to effectively respond to these challenges.

D. G. Iselin

DONALD G. ISELIN
Rear Admiral, CEC, USN
Commander,
Naval Facilities Engineering Command
and Chief of Civil Engineers

Continued From Inside Front Cover

ENGINEERING STUDENTS

Eager to get started in your professional career? The U.S. Navy offers an exceptional opportunity to join the young professionals pictured. Currently qualified applicants may earn over $830 a month while completing the final year at accredited engineering colleges! Upon graduation the student may be commissioned an Ensign, Civil Engineer Corps, and pursue an immediate career in engineering far in advance of civilian contemporaries. For complete details contact your nearest Officer Programs Officer of the U.S. Navy Recruiting Command.

Honor Graduate

ENS EDWIN B. WATTS
BS Sys. Engr./
Naval Academy
To New London, Conn.

•ENS D. A. WOLFE
BCE/Villanova U.
To Gulfport, Miss.

ENS DANIEL P. KING
BSEE/Naval Academy
To Gulfport, Miss.

ENS JAMES F. LEBIEDZ
BCE/Villanova U.
To Antarctica

ENS R. A. LEGERE
BSCE/Virginia Mil. Inst.
To Point Mugu, Calif.

ENS R. E. LONG, JR.
BSEE/U. of Texas
To Virginia Beach, Va.

LTJG M. M. McBRIER
MSCE/U. of Tennessee
To Guam

ENS SCOTT M. MERRILL
BCE/Villanova U.
To Brunswick, Me.

ENS R. H. MOORE
BSCE/The Citadel
To Gulfport, Miss.

ENS CONNIE L. MYERS
BSCE/U. of Washington
To Norfolk, Va.

ENS BLAIN L. NELSON
BSCE/UCLA
To Camp Pendleton, Calif.

ENS F. B. O'NEIL, JR.
BSCE/Lafayette U.
To Gulfport, Miss.

LTJG M. E. PHILLIPS
BS Arch./Kansas State
To Manila, R.P.

ENS R. A. RAMSAY
BEME/Vanderbilt U.
To Nea Makri, Greece

ENS K. H. RIMMEY
BAE/Penn State
To Okinawa

ENS J. E. SCALZO III
BS Chem. Engrg./
Notre Dame to Norfolk, Va.

•ENS R. D. SCHLESINGER
BS Sys. Engr./
Naval Academy
To Rota, Spain

LTJG D. R. SCHRADER
MSIE/State U. of N.Y.
at Buffalo
To Port Hueneme, Calif.

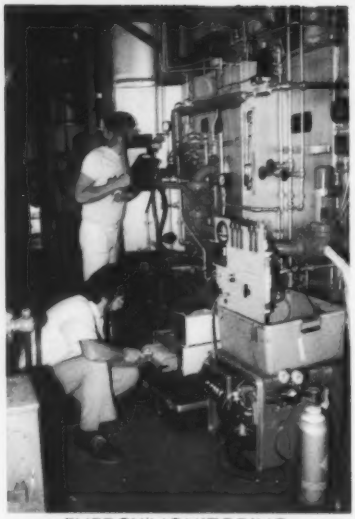
ENS GARY M. SIEMS
BS Ocean Engr./
Naval Academy
To Great Lakes, Ill.

ENS KENNETH S. SOCIE
BSCE/Penn State
To Guantanamo Bay, Cuba

ENS IAN D. STENNING
BSME/Carnegie-Mellon
To Antarctica

ENS DAVID J. STEWART
BSCE/USC
To Misawa, Japan

ENS B. A. WESTHAUS
BSME/Notre Dame
To Norfolk, Va.



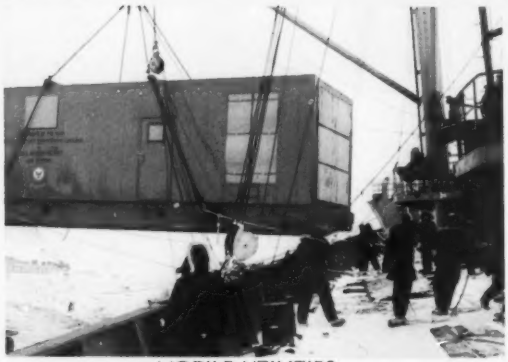
ENERGY/MONITORING

NAVAL ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY
NEESA

HAZARDOUS WASTES

ENVIRONMENT SAFEGUARDS

RADIOLOGICAL SAFETY



MOBILE UTILITIES

ON THE COVERS

(Front) The Navy's proposed new Trident submarine base and the initial development stages at King's Bay, Ga. *(Back)* The many responsibilities of the newly formed Navy Energy and Environmental Support Activity.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980-683-206